Geophysical Research Abstracts
Vol. 16, EGU2014-14917, 2014
EGU General Assembly 2014

The continent-ocean transition of the rifted South China continental margin

Alejandra L. Cameselle (1), César R. Ranero (2), Dieter Franke (3), and Udo Barckhausen (3)

(1) Barcelona Center for Subsurface Imaging, Institut de Ciències del Mar (CSIC), Spain (acameselle@icm.csic.es), (2) Barcelona Center for Subsurface Imaging, ICREA at CSIC, Barcelona, Spain, (3) BGR, Hannover, Germany

The continent to ocean transition (COT) architecture of rifted margins represents a key aspect in the study of the variability of different rifting systems and thus, to understand lithospheric extension and final break-up processes. We used 2250 km of reprocessed multichannel seismic data along 4 regional lines and magnetic data acquired across the NW South China continental margin to investigate a previously poorly defined COT. The along-strike structure of the NW subbasin of the South China Sea presents different amounts of extension allowing the study of conjugate pairs of continental margins and their COT in a relative small region. The time-migrated seismic sections allow us to interpreted clear continental and oceanic domains from differences in internal reflectivity, faulting style, fault-block geometry, the seismic character of the top of the basement, the geometry of sediment deposits, and Moho reflections. The continental domain is characterized by arrays of normal faults and associated tilted blocks overlaid by syn-rift sedimentary units. The Moho is imaged as sub-horizontal reflections that define a fairly continuous boundary typically at 8-10 s TWT. Estimation of the thickness of the continental crust using 6 km/s average velocity indicates a ∼22 km-thick continental crust under the uppermost slope thinning abruptly to ∼9-6 km under the lower slope. The oceanic crust has a comparatively highly reflective top of basement, little-faulting, not discernible syn-tectonic strata, and fairly constant thickness (4-8 km) over tens of km distance defined by usually clear Moho reflections. The COT can be very well defined based on MSC images and occurs across a ∼5-10 km narrow zone.

Rifting in the NW subbasin resulted in asymmetric conjugate margins. Arrays of tilted fault blocks covered by abundant syn-rift sediment are displayed across the northwestern South China continental margin, whereas the conjugate Macclesfield Bank margin shows abrupt thinning and little faulting. Seismic profiles also show a clear change in the tectonic structure of the margin from NE to SW. On the two NE-most lines, the abrupt crustal thinning occurs over a 20-40 km wide area resulting in final breakup. To the SW, the area of stretched continental crust extends over a comparatively broader ∼100-110 km segment of tilted fault-blocks. We interpret that the 3D structural variability and the narrow COT is related to the lateral NE to SW propagation of a spreading center. The early spreading center propagation in the NE suddenly stopped continental stretching during ongoing rifting, causing an abrupt break-up and a narrow COT. Later arrival of spreading center to the SW resulted in a comparatively broader segment of highly stretched continental crust. We suggest that the final structure of the northwest South China continental margin have been governed by the 3D interaction between rifting and oceanic spreading center propagation to a degree larger than by the local lithospheric structure during rifting.